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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/727,708	12/03/2003	Paul Koning	42P17610	8622
59796	7590	09/19/2006		
INTEL CORPORATION c/o INTELLEVATE, LLC P.O. BOX 52050 MINNEAPOLIS, MN 55402			EXAMINER LAMBELET, LAWRENCE EMILE	
			ART UNIT 1732	PAPER NUMBER

DATE MAILED: 09/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/727,708

Applicant(s)

KONING ET AL.

Examiner

Lawrence Lambelet

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) 11-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Election/Restrictions*

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-10, drawn to a method comprising imprinting at least one trench at least partially through a dielectric material, classified in class 264, subclass 40.1.
- II. Claims 11-15, drawn to a device comprising conductive layers and a dielectric layer having side walls, classified in class 438, subclass.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by another and materially different process, such as photolithographic masking and etching.

Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Michael Plimier on 8/25/06 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-10. Affirmation of this election must be made by applicant in replying to this Office action.

Claims 11-15 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davison (U.S. Patent Application Publication 2004/0266064), and further in view of Hanson et al (U.S. 6,962,670).

Davison discloses a method of imprinting a trench on a substrate, as recited by claim 1. Davison teaches applying a dielectric layer over a base layer (substrate) having conductive elements and imprinting with a tool to form a trench. See paragraphs [0024], [0025], [0032], and [0033]. The imprint goes through the dielectric layer to make contact with the conductive element below, as shown in Fig. 4E.

Davison does not teach adding a fluorescent material to the dielectric layer therewith to detect material at the bottom of the trench by observing radiation in a visible light range respondent to UV irradiation, as required by claims 1, 4, and 5. Davison further does not teach the fluorescent material less than 2%, as required by claims 2 and 3. Davison still further does not teach the determination of a failure mode, as required by claim 6.

Hanson et al, hereafter "Hanson", teaches a method of detecting the thickness of a layer of material by adding a concentration of fluorophores to the layer and measuring the visible light response to UV impingement. This is shown at lines 15-22 in column 3, and lines 4-27, 28-31, 38-43, and 59-67 in column 4. Hanson teaches that the detected fluorescence is a predictable function of thickness at lines 55-67 in column 13 and lines 1-9 in column 14. The detection of radiation from the bottom of the trench would have been obvious to one skilled in the art because the thickness of the layer at the bottom is reduced or negligible. Since the method measures magnitude (intensity) of the fluorescing signal, the comparison of the measurement to a threshold value provides a means for determination of failure.

Hanson teaches an addition level of fluoropore material at 100 ppm (0.01%). This is shown at lines 55-61 in column 11.

Davison and Hanson are combinable because they are concerned with a similar technical field, namely, non-uniformity of layer thicknesses in laminate structures. It would have been obvious to one of ordinary skill in the art at the time of the invention to include in the method of Davison the technique of detecting critical presence of material

by measuring thickness, as taught by Hanson. Davison teaches that a process of etching is required to remove excess dielectric material that may remain in the bottom of the trench in paragraph [0042]. The motivation to combine, therefore, would be the elimination of a non-productive etching step where sufficient removal can be validated by detection means.

Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koning et al (U.S. Patent Application Publication 2005/0116299), and further in view of Hanson.

Koning et al, hereafter "Koning", discloses a method of imprinting a dielectric layer with a tool, as recited in claim 7. Koning teaches pressing a male-patterned tool foil into a softened dielectric substrate in paragraph [0029]. Koning further teaches that the softened dielectric material sometimes sticks on the surface of the tool creating a need to remove contaminant (maintaining). See the same paragraph.

Koning does not teach adding a fluorescent material to the dielectric layer therewith to detect material stuck on the tool by observing radiation in a visible light range respondent to UV irradiation, as required by claims 7, 8, 9, and 10.

Hanson teaches a method of detecting the thickness of a layer of material by adding a concentration of fluorophores to the layer and measuring the visible light response to UV impingement. This is shown at lines 15-22 in column 3, and lines 4-27, 28-31, 38-43, and 59-67 in column 4. It would have been obvious to one of ordinary

skill that this method provides a means for detecting the presence of contaminant on the tool.

Koning and Hanson are combinable because they are concerned with a similar technical field, namely, non-uniformity of layer thicknesses in laminate structures. It would have been obvious to one of ordinary skill in the art at the time of the invention to include in the method of Koning the technique of detecting critical presence of material by measuring thickness, as taught by Hanson. Koning teaches that contamination on the tool causes degradation of features and reduced yield while cleaning requires painstaking removal and re-alignment. See paragraph [0029]. The motivation to combine, therefore, would be the definitive determination of contaminant presence.

Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Resnick et al (U.S. Patent Application Publication 2004/0224261), and further in view of Hanson et al.

Resnick et al, hereafter "Resnick", discloses a method of imprinting a trench, as recited by claims 1 and 7. Resnick teaches imprinting a patterning layer (dielectric) formed over a substrate layer (conductor) with a template (tool) to form a trench therethrough. See paragraphs [0012], [0013], and [0018] and claim 17 of the reference.

Resnick does not teach adding a fluorescent material to the dielectric in the patterning layer therewith to detect material at the bottom of the trench, or on the template, by observing radiation in a visible light range respondent to UV irradiation, as

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required by claims 1, 7, 4, 5, 8 and 9. Resnick further does not teach the fluorescent material less than 2%, as required by claims 2 and 3. Resnick still further does not teach the determination of a failure mode, as required by claims 6 and 10.

Hanson et al, hereafter "Hanson", teaches a method of detecting the thickness of a layer of material by adding a concentration of fluorophores to the layer and measuring the visible light response to UV impingement. This is shown at lines 15-22 in column 3, and lines 4-27, 28-31, 38-43, and 59-67 in column 4. Hanson teaches that the detected fluorescence is a predictable function of thickness at lines 55-67 in column 13 and lines 1-9 in column 14. The detection of radiation from the bottom of the trench would have been obvious to one skilled in the art because the thickness of the layer at the bottom is reduced or negligible. Since the method measures magnitude (intensity) of the fluorescing signal, the comparison of the measurement to a threshold value provides a means for determination of failure.

Hanson teaches an addition level of fluoropore material at 100 ppm (0.01%). This is shown at lines 55-61 in column 11.

Resnick and Hanson are combinable because they are concerned with a similar technical field, namely, non-uniformity of layer thicknesses in laminate structures. It would have been obvious to one of ordinary skill in the art at the time of the invention to include in the method of Resnick the technique of detecting critical presence of material by measuring thickness, as taught by Hanson. Resnick's template (tool) comprehends in the structure a certain thickness of material; hence, uniformity of thickness of the



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layer would be critical to a successful imprint. The motivation to combine, therefore, is to make a determination of uniformity of the layer to be imprinted.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following documents are cited to further show the state of the art with regard to imprinting on substrates:

U.S. Patent Application Publication 2005/0116387 to Davison et al

U.S. Patent 6,518,591 to Shamble et al

U.S. Patent Application Publication 2003/0205407 to Brist et al

U.S. Patent 6,524,641 to de Witzmann et al

U.S. Patent Application Publication 2005/0227497 to Padovani (not prior art)


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lawrence Lambelet whose telephone number is 571-272-1713. The examiner can normally be reached on 8 am-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on 571-272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LEL  
9/13/2006

  
CHRISTINA JOHNSON  
PRIMARY EXAMINER  
9/15/06